Combining Functions - Notes 1

Adding Functions

$(f+g)(x) = f(x) + g(x)$

- Simply leave the functions unchanged, add them together, and combine like terms.

Example 1: $f(x) = x^2 + 4x + 5$
$g(x) = x - 7$

$(f+g)(x) = f(x) + g(x)$
$= x^2 + 4x + 5 + x - 7$ (substitute/replace $f(x)$ and $g(x)$)
$= \boxed{x^2 + 5x - 2}$ (combine like terms)

Describe what's happening in each step

Ex 2: $f(x) = -2x^3 + x^2 - 1$
$g(x) = x^2 + x + 3$

$(f+g)(x) = f(x) + g(x)$
$= -2x^3 + x^2 - 1 + x^2 + x + 3$
$= \boxed{-2x^3 + 2x^2 + x + 2}$

Complete the example

* Remember, when you simplify you just combine like terms. Don't change any signs (like you do when you solve equations).

On a separate sheet, do p. 387 #5, 17, 19 (Adding only)

Combining Functions - Notes 2

SUBTRACTING FUNCTIONS

$$(f-g)(x) = f(x) - g(x)$$

* Just subtract the second function from the first.

* Be sure to distribute the negative!

Example 1: $f(x) = x^2+2x-3$

$g(x) = x+1$

$(f-g)(x) = f(x) - g(x)$ ← Why do I need parenthesis?

$= x^2+2x-3 - (x+1)$

$= x^2+2x-3 - x - 1$ (distribute the negative)

$= \boxed{x^2+x-4}$ (combine like terms) ← Describe the steps

Ex 2: $(g-f)(x) = g(x) - f(x)$

$= x+1 - (x^2+2x-3)$

$= x+1 - x^2 - 2x + 3$ (distribute negative)

$= \boxed{-x^2-x+4}$ (combine like terms)

Complete the example ⇒

On separate sheet, do p. 387 #5, 17, 19 (Subtracting only)

Combining Functions - Notes 3

MULTIPLYING FUNCTIONS

ans to leave instead of ugging in a number.

es NOT n to multiply / x at the end!

$$(f \cdot g)(x) = f(x) \cdot g(x)$$

- Multiply one function by the other
- distribute to simplify

Example 1: $f(x) = 3x$, $g(x) = x + 2$

$$(f \cdot g)(x) = f(x) \cdot g(x)$$
$$= 3x(x+2)$$
$$= \boxed{3x^2 + 6x}$$

← Describe the steps

distribute

Example 2: $f(x) = x^2 + 5x$ $g(x) = 3x - 2$

$$(f \cdot g)(x) = f(x) \cdot g(x)$$
$$= (x^2 + 5x)(3x - 2)$$
$$= 3x^3 - 2x^2 + 15x^2 - 10x$$
$$= \boxed{3x^3 + 13x^2 - 10x}$$

Compute the example →

On a separate sheet, do p. 387 #5, 17, 19 (multiplying only)

Combining Functions – Notes 4

DIVIDING FUNCTIONS

$$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}$$

- Simplify & put the function indicated on top of the other (then you're done!).

Example 1: $f(x) = x + 2$, $g(x) = 3x$

- $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)} = \boxed{\frac{x+2}{3x}}$

* Note that in the new function $\left(\frac{f}{g}\right)(x) = \frac{x+2}{3x}$, x CANNOT be 0 (because you can't divide by 0).

fill in the reason

- $\left(\frac{g}{f}\right)(x) = \frac{g(x)}{f(x)} = \frac{3x}{x+2}$ ←

Complete the example

* Note $x + 2 \neq 0$ so $x \neq -2$! ←

≠ symbol for not equal

On a separate sheet, do p. 387 #5, 17, 19 (dividing only)